

REMARKS

Claims 1-3, 5-13, 15-23, and 25-28 are pending.

Claims 1, 12, 13, and 21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 3093695 (“JP ‘695”) in view of Takahiro (JP 03-075298). Applicants traverse.

The Office Action asserts that JP ‘695 teaches a method of growing a diamond structure. The Office Action states that on a substrate, a layer of diamond nucleation sites is prepared. The Office Action avers that the sites are orientated the same for the vapor growth. The Office Action asserts that a layer of polycrystalline diamond is grown on the nucleation sites and the nucleation sites can be diamond in the JP ‘695 reference. The Office Action asserts that the orientation is of the polycrystalline layer. The Office Action acknowledges that the difference between the instant claims and the prior art is that the nucleation sites are single crystal diamonds placed next to each other. The Office Action relies on Takahiro in an attempt to cure the admitted deficiencies of JP ‘695.

JP ‘695 discusses the method of preparing a *highly oriented* ((4,0,0) orientation) polycrystalline diamond on a monocrystalline substrate. In JP ‘695, elements including Si, Mo and SiC, *but not including diamond*, are named for the monocrystalline substrate. In the process of preparing the *highly oriented* polycrystalline diamond, the monocrystalline substrate having a (1, 0, 0) face is subjected to vapor phase synthesis for diamond growth. A diamond layer is formed in the process. The diamond is grown on a substrate made of Si, Mo or SiC. JP ‘695 is *silent* on growing the crystal on a diamond substrate. The diamond layer consists of a plurality of diamond crystal grains having (1, 0, 0) orientation and those not having (1, 0, 0) orientation. In other words, the diamond layer is an aggregate of variously oriented diamond crystals including (1, 0, 0), (1, 1, 1), (2, 2, 0), etc. Then, crystal grains other than those having (1, 0, 0)

orientation are subject to heating under oxygen or water vapor, dipping into molten-salt of KN03, or the like, in order to selectively eliminate the *non*-(1, 0, 0) crystals from the diamond layer because their crystallinity is poor, and, thus provides less resistance against oxidation than (1, 0, 0) crystal grains. The remaining (1, 0, 0) diamond crystals serve as nucleation sites for the successive chemical vapor growth of diamond in JP '695.

The diamond crystals that are additionally grown on the substrate with the (1, 0, 0) diamond crystals as nucleation sites are *highly oriented* having 120 strength of diffraction line of (4, 0, 0) when strength of diffraction line of (1, 1, 1) measured by X ray diffraction is 100. The term "polycrystal" in JP '695 is an aggregate of small-sized single crystal diamonds, where in the instant application "polycrystals" are made of randomly oriented monocrystals, as required by independent claims 1, 12, and 21. Thus, the product of JP '695 is an aggregate of *highly oriented* single crystal diamonds, not a polycrystalline diamond.

An aspect of the present invention includes polycrystals made of randomly oriented monocrystals. In contrast, the diamond grains of JP '695 are grown so that their orientation is aligned with respect to the uniformly oriented nucleation seed diamond grains to form an aggregate of *highly oriented* single crystal diamonds. JP '695 includes a diamond grown on the (1, 0, 0) monocrystalline diamonds that is *highly oriented*. As shown in Fig. 4 of JP '695, the grown diamond having a strong diffraction line of (4, 0, 0). JP '695 describes an epitaxial growth on a monocrystalline diamond substrate. However, randomly oriented polycrystalline diamond lay do not form in epitaxial growth. In contrast to the Examiner's assertion, highly oriented single crystal diamonds are considerably *different* from the claimed crystals with random orientation.

According to the claimed subject matter per claims 1, 12, and 21, the polycrystalline diamond film has randomly oriented diamond crystals. However, JP '695 does not disclose or remotely suggest the present claimed limitation.

The Examiner contends that secondary reference to Takahiro teaches that large single crystal diamonds can be placed together to create a base for diamond growth. The Office Action avers that it would have been obvious to one of ordinary skill in the art to modify JP '695 with the teachings of Takahiro to use a single crystal diamond base in order to ensure that the grown vapor layer of diamond has uniform orientation.

Takahiro discusses a plurality of monocrystalline diamond that was used as a substrate to form a CVD-grown monocrystalline diamond layer thereon. Takahiro is *silent* regarding growing "randomly-oriented" polycrystalline diamond layer. It is well known by persons skilled in the art that polycrystalline with a specific orientation is normally formed in gas phase growth process and a polycrystalline diamond consisting of diamond grain crystals having random orientation throughout the entire face of the substrate is not achievable. In one embodiment of the present application, randomly-oriented polycrystalline diamond film are grown on a monocrystalline diamond substrate to integrate a plurality of monocrystalline diamond substrates. As disclosed in the present specification, growing randomly-oriented polycrystalline diamond film on a monocrystalline diamond substrate requires special treatments or controlling conditions (*see, e.g.*, Para. [0055] and Table 1 of the originally filed specification).

Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313,

1317 (Fed. Cir. 2000); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). There is no suggestion in JP '695 to modify a **highly oriented** diamond polycrystalline film to have crystals with **random orientation**, nor does common sense dictate the Examiner-asserted modifications. The Examiner has not provided any evidence that there would be any obvious benefit in making the asserted modification of JP '695. See *KSR Int'l Co. v. Teleflex, Inc.*, 127 S.Ct. 1727, 82 USPQ2d 1385 (2007).

The only teaching of the claimed diamond polycrystalline film having crystals with random orientation is found in Applicants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must not be based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claims 2, 3, 5-11, 15-20, 22, 23, and 25-28 are rejected under 35 U.S.C. § 103(a) as being unpatentable over JP '695 in view of Takahiro. The Office Action acknowledges that JP '695 and Takahiro differ from the instant claims in the dimensions of the layers and orientations. The Office Action contends that in the absence of unexpected results it would have been obvious to one of ordinary skill in the art to determine through routine experimentation the optimum, operable dimensions and dimensions and orientation in the combined references in order to create a uniform layer of diamond improving the properties.

The Examiner's "absence of unexpected results" approach in attempting to establish a *prima facie* case of obviousness denies Applicants' their right to procedural due process of law. This is because there is absolutely no burden upon Applicants to even offer an argument, let alone the proffer evidence of unexpected results, until such time as the Examiner has discharged his burden of establishing a *prima facie* case of obviousness, which the Examiner has not done.

*In re Deuel*, 51 F.3d 1552, 34 USPQ2d 1210 (Fed. Cir. 1995); *In re Rijckaert*, 9 F.3d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993); *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992).

The only teaching of the **claimed diamond polycrystalline film having crystals with random orientation** is found in Applicants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must both be found in the cited reference, and not based on the Applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). The Examiner's retrospective assessment of the claimed invention and use of unsupported conclusory statements are not legally sufficient to generate a case of *prima facie* obviousness. The motivation for modifying the prior art must come from the prior art and must be based on facts. The Examiner is not free to ignore the judicial requirement for **facts**. To do so is legal error. *In re Lee*, 277 F.3d 1338 (Fed. Cir. 2002). Apparently, the Examiner has relied on improper hindsight reasoning in reaching the conclusion of obviousness.

Thereby as taught in the instant specification, the resultant diamond composite substrate exhibits an increase in bending resistance (*see, e.g.*, Tables 2 and 4; Paras. [0056]-[0063] of the originally filed specification). However, the cited references do not disclose or suggest this, and apparently are unaware of the unexpected improvement in **both** high toughness and high thermal conductivity. Neither JP '695 nor Takahiro, individually or combined, disclose or suggest growing polycrystalline diamond having crystals with random orientation on a diamond monocrystalline substrate, as required by claims 1, 12, and 21.

Withdrawal of the foregoing rejections is respectfully requested.

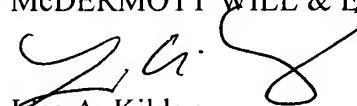
**Conclusion**

In view of the above remarks, Applicants submit that this application should be allowed and the case passed to issue. If there are any questions regarding this Response or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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